an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and

at least one location sensor on said distal end of said body for determining a location of said contact electrode and a location of said non-contact electrodes, the location of the non-contact electrodes determined by said at least one location sensor defining a cloud of space representing a minimum volume of the chamber of the heart.

Claim 12. (Twice Amended) A catheter for mapping a chamber of the heart comprising:

a body having a proximal end and a distal end, said distal end having a distal tip;

an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and

at least one location sensor proximate to said distal tip for determining a location of said non-contact electrodes, the location of said non-contact electrodes determined by said at least one location sensor defining a cloud of space representing a minimum volume of the chamber of the heart.

Claim 16. (Twice Amended) A method for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said method comprising the steps of:

a) providing a catheter comprising a body having a proximal end and a distal end, said distal end having a distal tip; a contact electrode at said distal tip; an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and at least one location sensor on said distal end of said body;

b) advancing said catheter into said chamber of said heart;

c) determining a location of said contact electrode and a location of said non-contact electrodes using said at least one location sensor wherein the location of said non-contact electrodes defines a cloud of space;

d) contacting a wall of said chamber of said heart with said contact electrode at a plurality of contact points;

e) acquiring electrical information and location information from each of said electrodes and said at least one location sensor, respectively, said acquisition taking place over at least one cardiac cycle while said contact electrode is in contact with each of said contact points; and

f) determining a minimum volume of said heart chamber using the location of said non-contact electrodes;

g) generating an electrical map of said heart chamber from said acquired location and electrical information.

Claim 35. (Twice Amended) A method for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said method comprising the steps of:

a) providing a catheter comprising a body having a proximal end and a distal end, said distal end having a distal tip; an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and at least one location sensor proximate to said catheter distal tip;

b) advancing said catheter into said chamber of said heart;

c) determining a location of said non-contact electrodes using said at least one location sensor wherein the location of said non-contact electrodes defines a cloud of space;

d) contacting a wall of said chamber of said heart with said catheter distal tip at a plurality of contact points;

e) acquiring electrical information and location information from each of said non-contact electrodes and said at least one location sensor, respectively, said acquisition taking place over at least one cardiac cycle while said catheter distal tip is in contact with each of said contact points;

f) determining a minimum volume of said heart chamber using the location of the non-contact electrodes; and

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g) generating an electrical map of said heart chamber from said acquired location and electrical information.

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Claim 42. (Twice Amended) Apparatus for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said apparatus comprising:

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a catheter including a body having a proximal end and a distal end, said distal end having a distal tip; a contact electrode at said distal tip; an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and at least one location sensor on said distal end of said body for determining a location of said contact electrode and a location of said non-contact electrodes, the location of the non-contact electrodes determined by said at least one location sensor defining a cloud of space representing a minimum volume of the chamber of the heart; said catheter being adapted to contacting a wall of said chamber of said heart with said contact electrode at a plurality of contact points; and a signal processor operatively connected to said catheter for acquiring electrical information and location information from each of said contact electrode and said non-contact electrodes and location sensors, respectively, over at least one cardiac cycle while said contact electrode is in contact with each of said contact points, said signal processor also generating an electrical map of said heart chamber from said acquired location and electrical information.

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Claim 47. (Twice Amended) Apparatus for generating an electrical map of a chamber of a heart, said map depicting an electrical characteristic of the chamber as a function of chamber geometry, said apparatus comprising:

a catheter including a body having a proximal end and a distal end, said distal end having a distal tip; an array of non-contact electrodes on said distal end of said body, said array having a proximal end and a distal end, wherein said non-contact electrodes are linearly arranged along a longitudinal axis of said body; and at least one location sensor proximate to said catheter distal tip for determining a location of said non-contact electrodes, the location of said non-contact electrodes determined by said at least one

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location sensor defining a cloud of space representing a minimum volume of the chamber of the heart; said catheter being adapted to contacting a wall of said chamber of said heart with said catheter distal tip at a plurality of contact points; and a signal processor for acquiring electrical information and location information from each of said electrodes and location sensors, respectively, over at least one cardiac cycle while said catheter distal tip is in contact with each of said contact points; said signal processor also generating an electrical map of said heart chamber from said acquired location and electrical information.